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(12) **United States Patent**
Rivera

(10) **Patent No.: US 6,786,592 B2**
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(54) **INTERCHANGEABLE LENS EYEGLASS SYSTEM WITH INTERCHANGEABLE NOSEPIECE**

(76) Inventor: **John C. Rivera**, 4544 Old Pond Dr., Plano, TX (US) 75024

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/155,148**

(22) Filed: **May 25, 2002**

(65) **Prior Publication Data**

US 2003/0048407 A1 Mar. 13, 2003

Related U.S. Application Data

(62) Division of application No. 09/949,553, filed on Sep. 7, 2001, now Pat. No. 6,428,165.

(51) **Int. Cl.**^{7} **G02C 1/08**

(52) **U.S. Cl.** **351/95**; 351/90; 351/91; 351/92

(58) **Field of Search** 351/95, 96, 92, 351/90, 91, 93, 94, 97, 98, 99, 100, 101, 102, 85, 86

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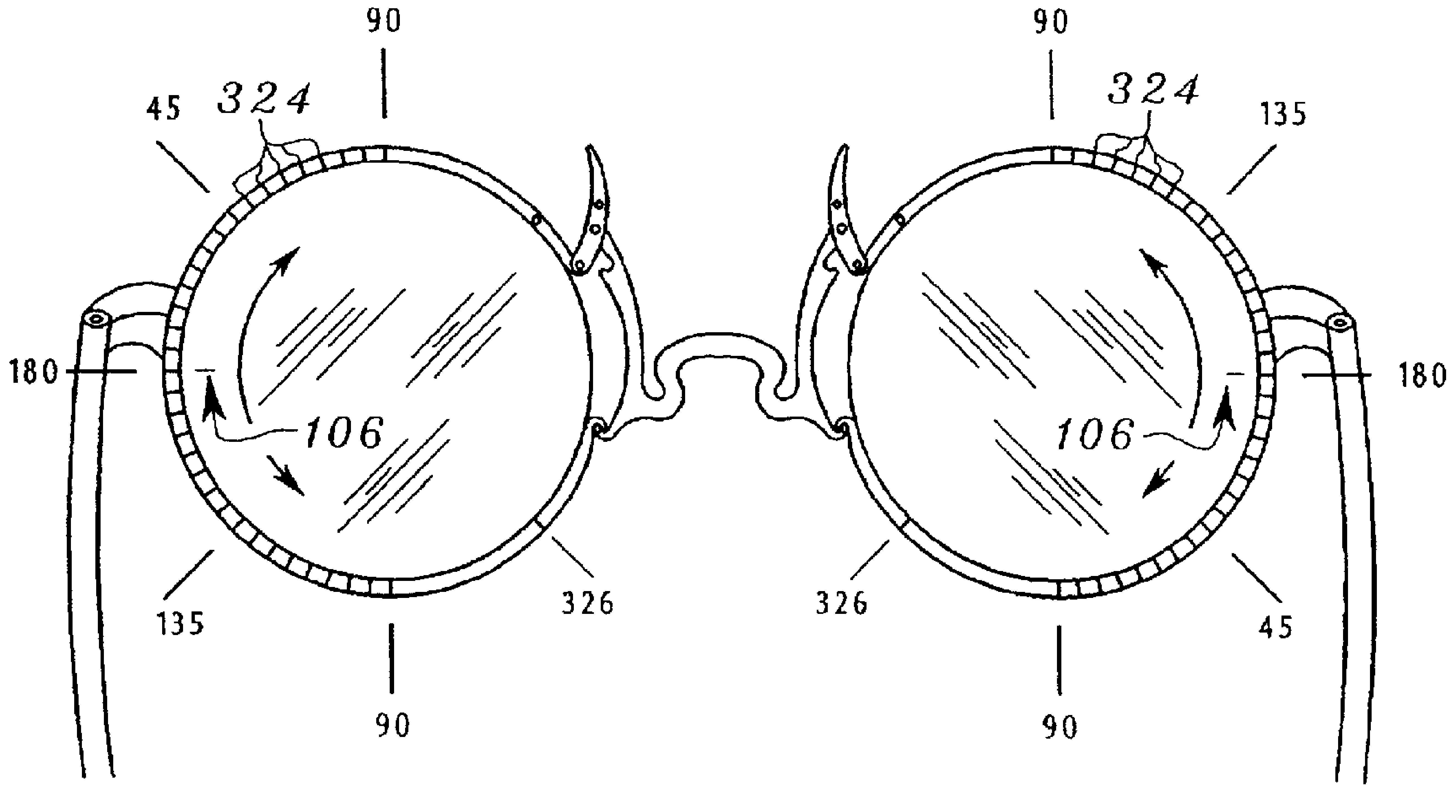
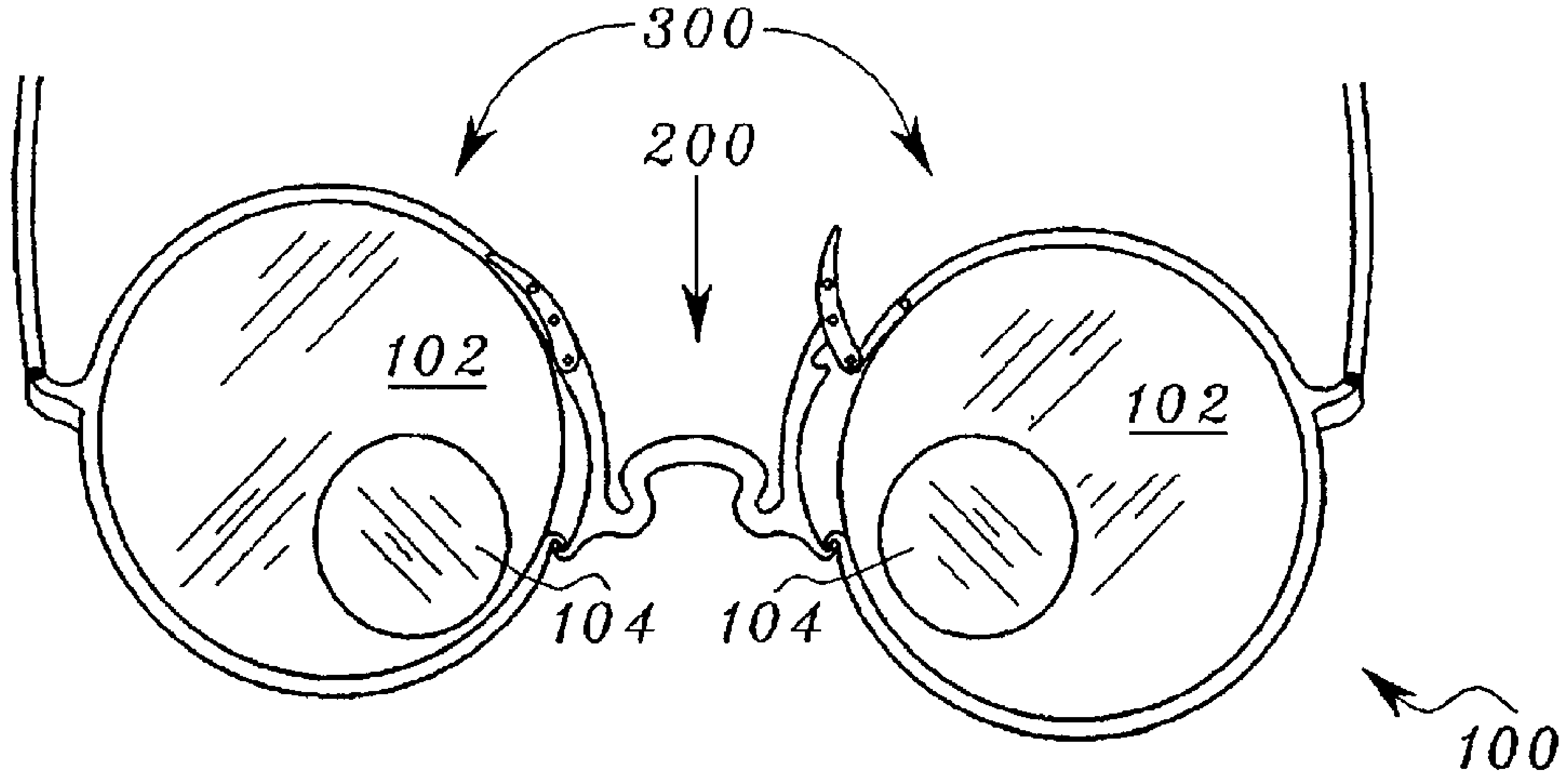
Primary Examiner—Hung X. Dang
(74) *Attorney, Agent, or Firm*—Rudolf O. Siegesmund

(57) **ABSTRACT**

A method for assembling eyeglasses is disclosed. The method consists of selecting a pair of lenses from an inventory of circular lenses according to a patient's prescription. The circular lenses have the same geometric and optical center, so they do not require ground (grinded) decentration. The round shape also allows the lenses to be rotated within the eyewires when the clasps are open. The lenses are mounted into the annular eyewires of the eyeglasses, rotated so that the cylindrical axis is appropriately aligned, and secured in place so that the lenses may not rotate. The correct pupillary distance is achieved by varying the width of the nosepiece. Bifocal lenses may be selected based on the patient's bifocal prescription and positioned on the existing lens according to the bifocal markings on the eyewires.

8 Claims, 3 Drawing Sheets

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200
102
102
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104
100

Fig. 1

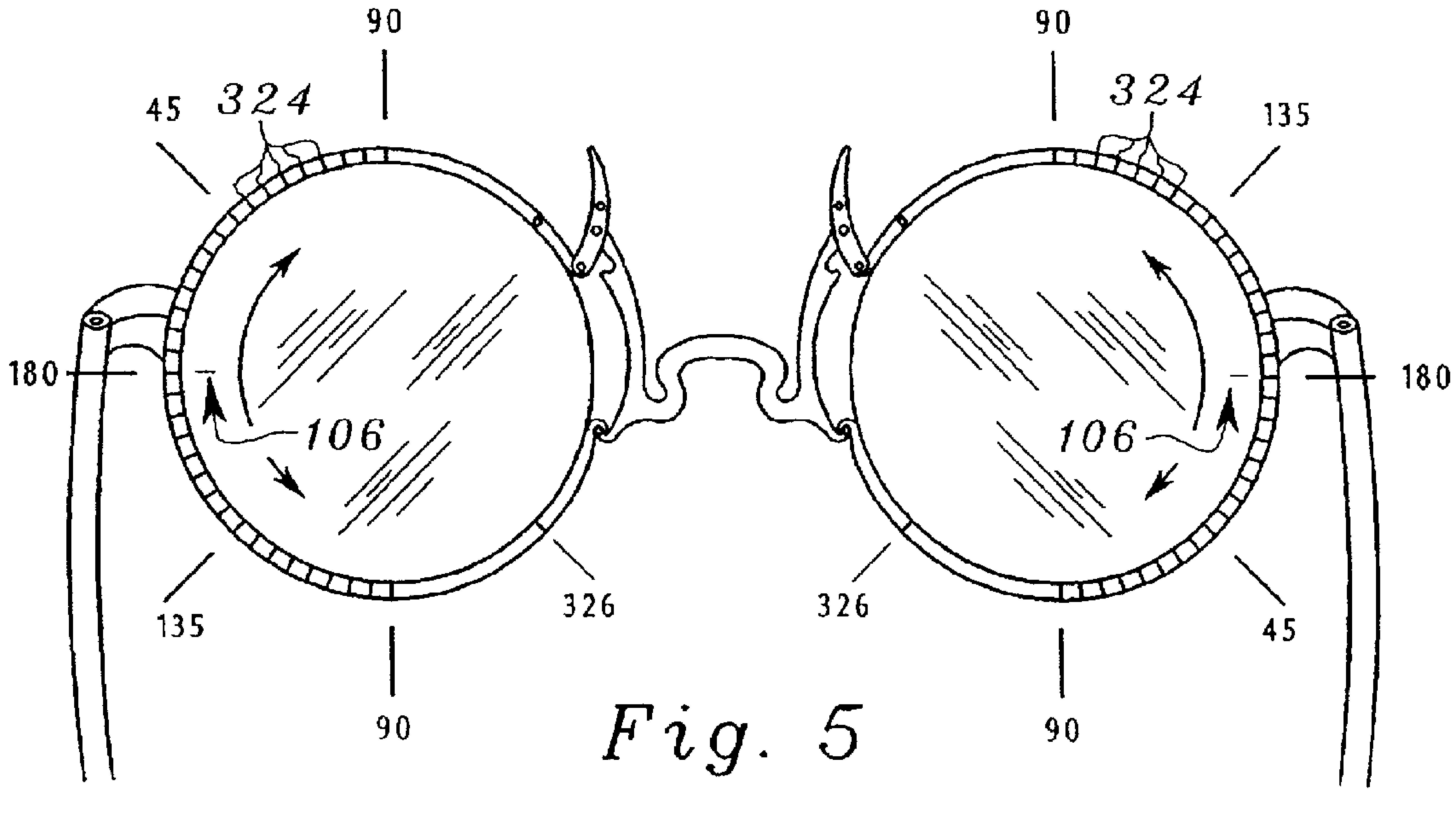
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Fig. 5

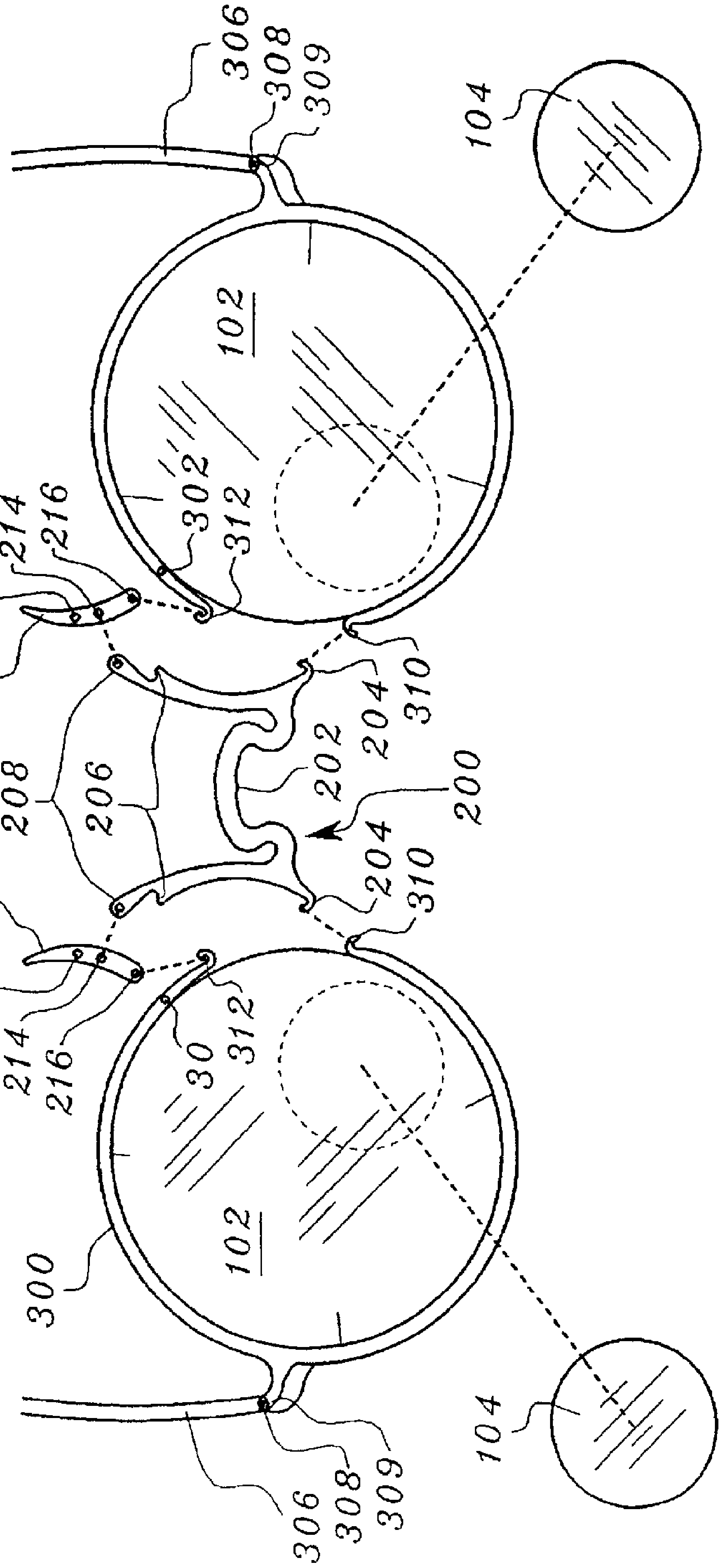
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Fig. 2

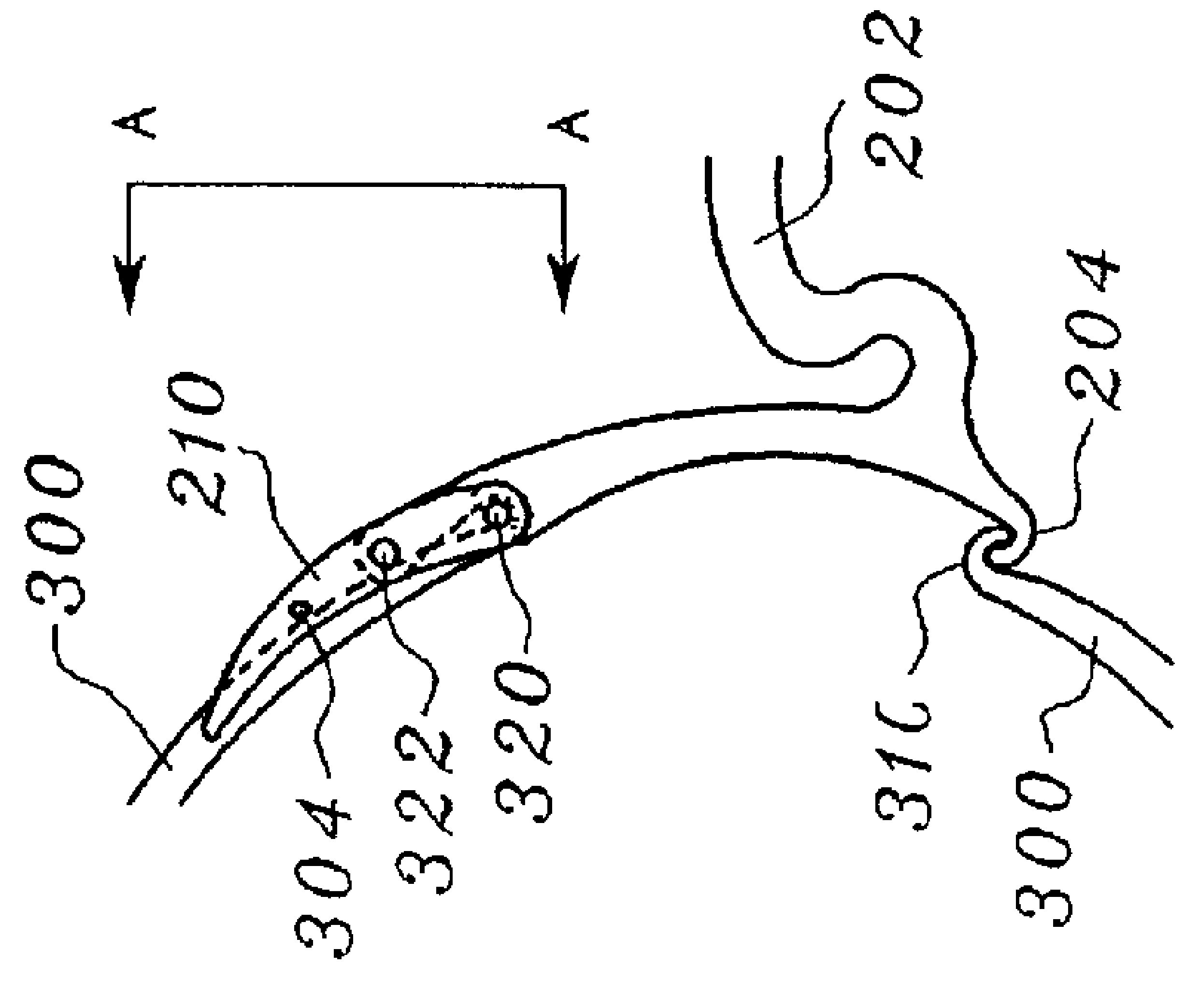

Fig. 3

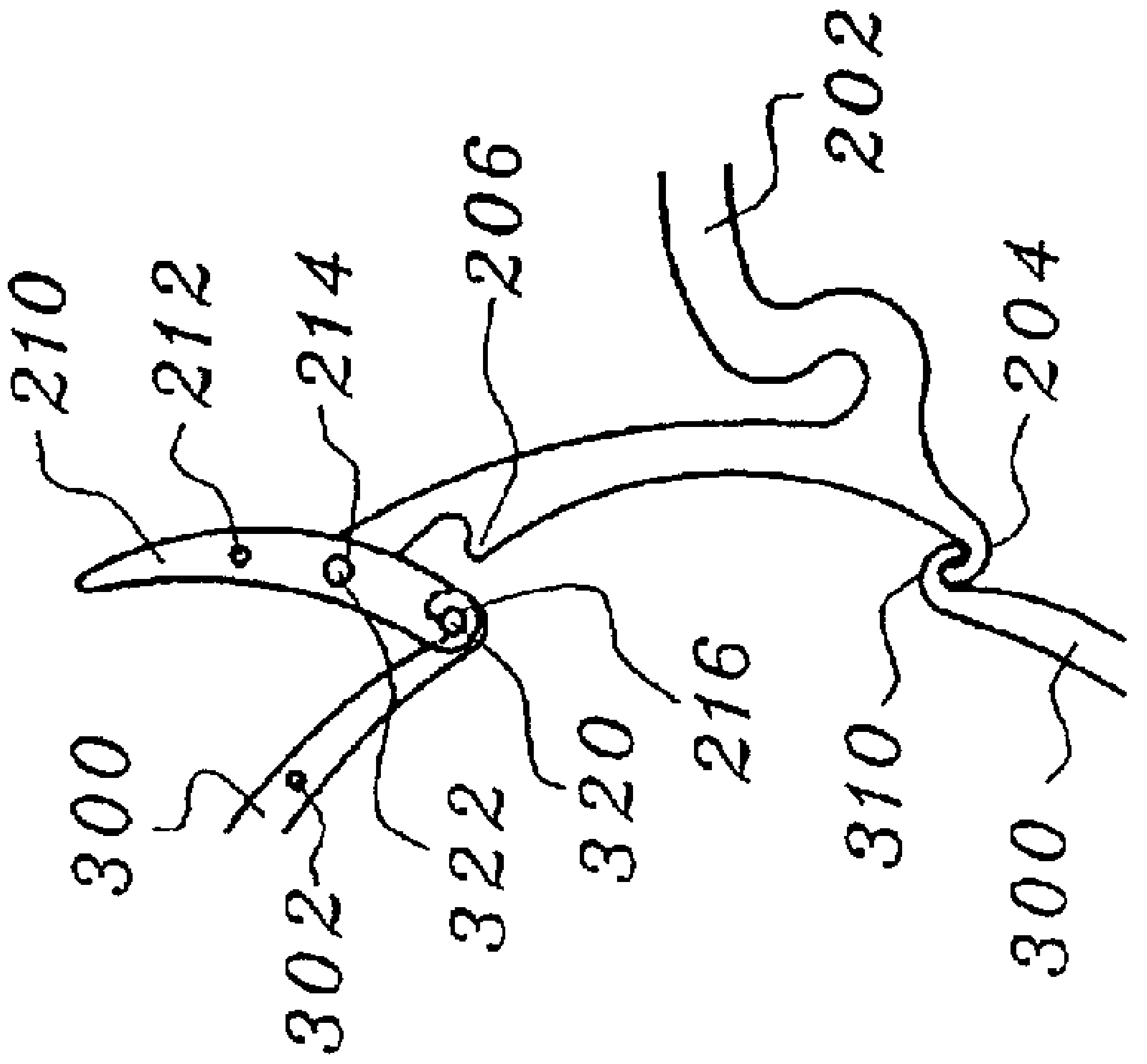

Fig. 4

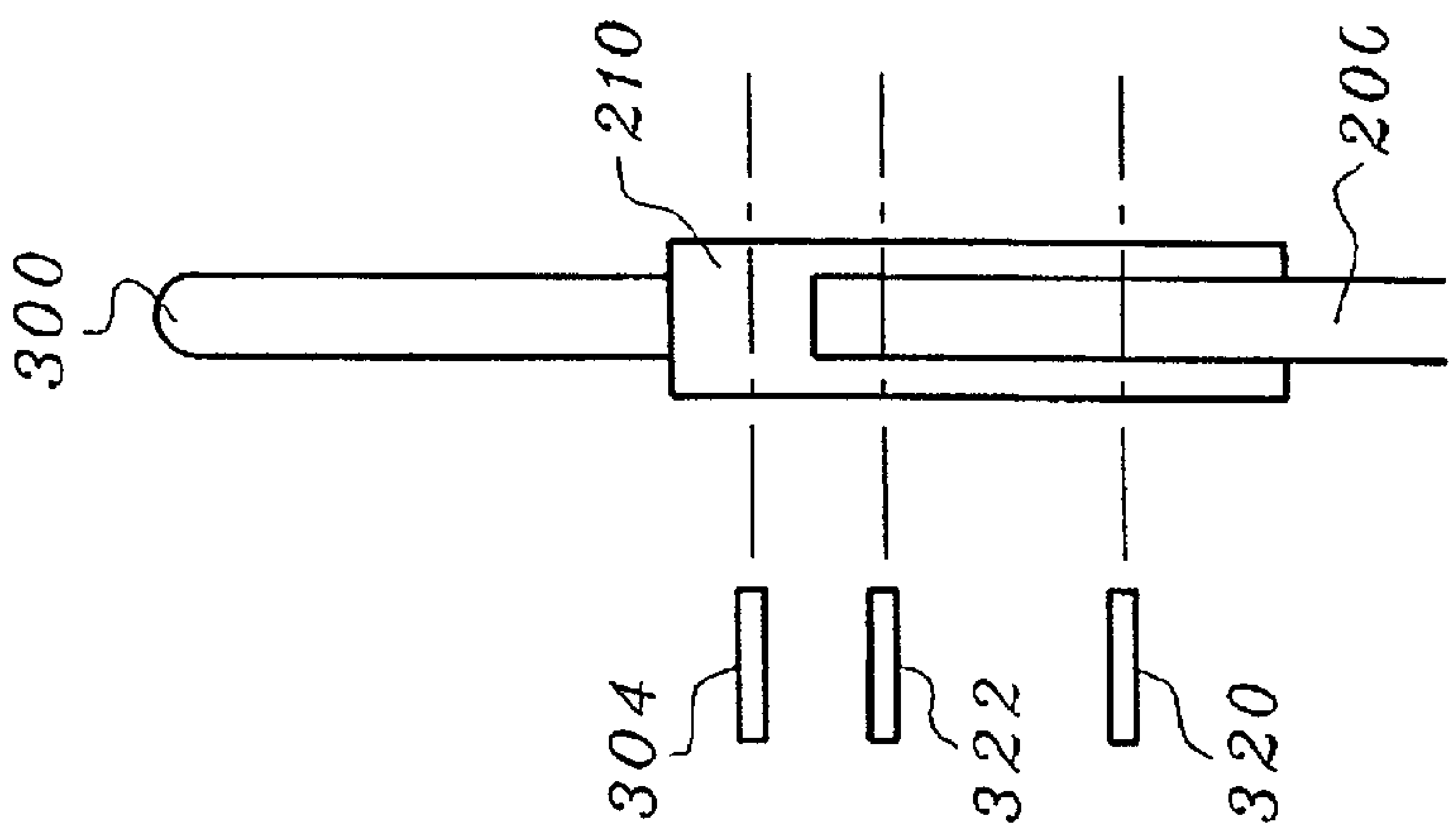

Fig. 6

INTERCHANGEABLE LENS EYEGLASS SYSTEM WITH INTERCHANGEABLE NOSEPIECE

This application is a division of application Ser. No. 09/949,553, filed on Sep. 7, 2001 now U.S. Pat. No. 6,428,165.

FIELD OF INVENTION

The present invention is directed to eyeglasses with removable and interchangeable lenses and a removable and interchangeable nosepiece, an eyeglass system based on the eyeglasses, a method for assembling the eyeglasses, and a method for positioning and securing additional bifocal segments to the eyeglass lenses.

BACKGROUND

Manufacturing eyeglasses can be a costly and time-consuming process. The eyewires must be fitted so that the optical centers of the lenses are aligned with the patient's eyes. The patient's prescription is defined by the pupillary distance, the distance between the patient's pupils, and spherical and cylindrical corrective factors. Lenses that provide cylindrical correction, unlike purely spherical lenses, must maintain alignment along a prescribed axis that varies from patient to patient. Therefore, in manufacturing traditional prescription glasses, the lenses must be ground to fit the eyewire and also correctly oriented based on their spherical and cylindrical properties.

Preparing prescription glasses includes the process of marking and layout to determine optical center and cylindrical axis of the lens. The lenses are then traced and cut to the shape of the eyewire. If the geometric center of the eyewires does not match the optical center position of the lenses, the lenses are ground to change the position of the optical center in a process called decentration. Finally, the lenses must be beveled and mounted to the eyewires. Any errors made during this process usually cannot be corrected and the process must begin anew. Often a defect in lens manufacturing cannot be discovered until the optometrist verifies that the glasses fit the patient's prescription. Errors discovered at this point may take weeks to correct.

Interchangeable lenses are known in the prior art. U.S. Pat. No. 5,293,185 (the '185 patent) discloses an "Eyeglass Eyewire Permitting Interchanging Lenses" utilizing a spring loaded closure for securing the lenses within the eyewires. What is needed beyond the '185 patent is an interchangeable prescription lens system that does not require the lenses to go through marking, layout, tracing, cutting, decentration, and beveling, allowing optical dispensers to provide prescription glasses to their patients in a matter of minutes. An interchangeable nosepiece which can change lens decentration without recutting the lenses is also needed. Furthermore, a need exists for an interchangeable prescription lens system that can provide glasses, including bifocals, in the areas of temporary prescriptive eyewear, optical retail environments, military field environments requiring rapid replacement of eyeglasses, and remote lip locations where standard optical manufacturing is impractical.

SUMMARY OF INVENTION

An apparatus meeting the above stated needs is an Interchangeable Lens Eyeglass System with Interchangeable Nosepiece comprising a nosepiece coupled to a pair of annular eyewires, and a pair of clasps hinged to the nosepiece that cooperate with each of the two annular eyewires to secure the lenses. Each clasp and eyewire contains a locking hole into which a pin may be inserted to secure the clasp in the closed position. The eyeglasses also contain a pair of temples, each of which is pivotally joined to each of the eyewires. The eyewires have axial markings that indicate the cylindrical axis of the lenses, and bifocal markings that indicate the correct position of the bifocal segments so that lenses may be installed and removed without the need for instruments or tools.

Additionally, a method for assembling eyeglasses in the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece is disclosed. The method consists of selecting a pair of lenses from an inventory of circular lenses according to a patient's prescription. The circular lenses have the same geometric and optical center, so they do not require decentration by grinding. The round shape also allows the lenses to be rotated within the eyewires when the clasps are open. The lenses are mounted into the annular eyewires of the eyeglasses, rotated so that the cylindrical axis is appropriately aligned, and secured in place so that the lenses may not rotate. The correct pupillary distance is achieved by varying the width of the nosepiece. Bifocal lenses may be selected based on the patient's bifocal prescription and positioned on the existing lens according to the bifocal markings on the eyewires.

BRIEF DESCRIPTION OF FIGURES

FIG. **1** is a frontal elevation view of the preferred embodiment of the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece with bifocal additions showing the left clasp closed and the right clasp is open;

FIG. **2** is an exploded frontal elevation view of the preferred embodiment of the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece;

FIG. **3** is a detailed frontal elevation view of the preferred embodiment of the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece with the clasp in its closed position;

FIG. **4** is a detailed frontal elevation view of the preferred embodiment of the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece with the clasp in its opened position;

FIG. **5** is a rear elevation view of the preferred embodiment of the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece showing the axis orientation, the axis markings, and the bifocal markings.; and

FIG. **6** is a detailed side elevation of the preferred embodiment of the Interchangeable Lens Eyeglass System with Interchangeable Nosepiece along line a—a in FIG. **3** showing the clasp and pin placement.

DESCRIPTION OF PREFERRED EMBODIMENT

FIG. **1** shows eyeglasses **100** with two lenses **102** and two optional bifocal segments **104**. Lenses **102** are secured by the tension created around eyewire **300** when clasp **210** is closed (see FIG. **2**). Bifocal segments **104**, if required, may be secured to lenses **102** by an adhesive.

Referring to FIG. **2**, nosepiece **200** contains nose rest **202**, nosepiece hooks **204**, nosepiece arms **206**, and nosepiece holes **208**. Nose rest **202** is adapted to rest on the patient's nose (not shown) and is not limited to the style and type described by the preferred embodiment. Nose rest **202** may vary in width and design as determined by those skilled in the art. Nosepiece hook **204** projects downwardly from nose rest **202** and couples with eyewire lower hook **310**. Projecting upwardly from nose rest **202**, nosepiece **200** contains nosepiece arm **206**, extending outwardly from nosepiece **200**. Nosepiece arm **206** is shaped to accommodate eyewire upper hook **312** when clasp **210** is moved into the closed position. Nosepiece **200** extends upwardly from nosepiece arm **206** and contains nosepiece hole **208**. Nosepiece hole **208** is a round aperture in nosepiece **200**. Clasp **210** is pivotally connected to nosepiece **200** by inserting hinge pin **322** in nosepiece hole **208**.

Referring to FIG. **6**, Clasp **210** has two forks spaced apart to accommodate nosepiece **200**, nosepiece arm **206**, and eyewire **300**. As seen in FIG. **4**, clasp **210** has clasp locking hole **212**, clasp hinge hole **214**, and clasp anchor hole **216**. Clasp **210** is pivotally joined to eyewire **300** by anchor pin **320** through clasp anchor hole **216** and eyewire upper hook **312**. Clasp **210** is pivotally joined to nosepiece **200** by hinge pin **322** through clasp hinge hole **214** and nosepiece hole **208**. As seen in FIG. **3**, clasp **210** can be secured in its closed position by inserting locking pin **304** though clasp locking hole **212** and eyewire locking hole **302**.

Referring to FIG. **2**, eyeglasses **100** contain eyewires **300** which are annular in shape and join to nosepiece **200**, clasp **210**, and temple **306**. Eyewire **300** contains eyewire lower hook **310**, eyewire upper hook **312**, and eyewire temple hole **309**. Eyewire **300** is pivotally joined to clasp **210** by anchor pin **320** through C-shaped eyewire upper hook **312** and clasp anchor hole **216**. Eyewire **300** secures clasp **210** in its closed position by locking pin **304** through eyewire locking hole **302** and clasp locking hole **212**. Eyewire **300** is joined to nosepiece **200** by the coupling of eyewire lower hook **310** and nosepiece hook **204**. Eyewire **300** is pivotally joined to temple **306** by temple pin **308** inserted through temple hole **307** and into eyewire temple hole **309**. Persons skilled in the art will be aware of additional ways to connect temple **306** to eyewire **300**. Referring to FIG. **5**, eyeglasses **100** contain a plurality of axis markings **324** on the rear face of eyewire **300**. Axis markings **324** represent the cylindrical axis alignment for lens **102**. Lens **102** has axis mark **106** to indicate its cylindrical axis. Eyewire **300** also contains bifocal marking **326**. Bifocal marking **326** is used to position bifocal **104**.

Eyeglasses **100** fit together with lenses **102** in a process that does not require marking, layout, tracing, cutting, decentration, or beveling at the time of assembly. The elimination of these steps significantly reduces the time and cost of assembling and preparing eyeglasses **100**. The process of using eyeglasses **100** requires assembling an inventory of circular, pre-finished lenses **102** of a fixed diameter with the same geometric and optical centers. Each lens **102** having a cylindrical correction also contains axis mark **106**, which is an indicator of the cylindrical axis of lens **102**. Each lens **102** in the inventory of lenses **102** is shaped along its edge to fit into the annulus of eyewire **300**. A variety of different width nosepieces **200** are maintained. An appropriate nosepiece **200** is selected based on the pupillary distance of the patient. The width of nosepiece **200** is appropriate if the geometric and optical centers of lenses **102** are spaced at the appropriate pupillary distance as required by the patient's prescription. The appropriate nose rest **202** design is selected with nosepiece **200** to accommodate the patient's nose shape.

Clasp **210** is attached to nosepiece **200** by inserting hinge pin **322** through clasp hinge hole **214** and nosepiece hole **208**. Nosepiece **200** is then joined to eyewire **300** by coupling nosepiece hook **204** to eyewire lower hook **310**. Clasp **210** is attached to eyewire **300** by inserting anchor pin **320** through clasp anchor hole **216** and eyewire upper hook **312**. Eyewire **300** is attached to temple **306** by inserting temple pin **308** through temple hole **307** and eyewire temple hole **309**.

A lens **102** is selected based on the patient's prescription. Lens **102** is then inserted into the annulus of eyewire **300**. Next, axis mark **106** on lens **102** is aligned with the appropriate axis marking **324** on eyewire **300**. When lens **102** has been aligned according to the patient's prescription, clasp **210** is closed. The patient verifies that the lenses are the correct prescription. If eyeglasses **100** are satisfactory, locking pin **304** may be installed through clasp locking hole **212** and eyewire locking hole **302** to secure clasp **210** in its closed position.

The addition of bifocal segments **104** to lenses **102** creates a pair of bifocal glasses. Bifocal segments may be affixed to lens **102** without altering either lens **102** or bifocal segment **104**. In order to create a pair of bifocal glasses, an inventory of different strength bifocal segments **104** is assembled. Bifocal segment **104** is selected based on the patient's prescription. Bifocal segment **104** is adhered to lens **102** with an appropriate adhesive. The placement of bifocal segment **104** on lens **102** is determined by the patient's prescription. Placement of lens **102** with bifocal segment **104** affixed to eyewires **300** is determined by bifocal marking **326** on the back of eyewire **300**.

It is to be understood that while certain forms of the preferred embodiment of eyeglasses **100** have been described herein, it is not to be limited to the specific forms or arrangement of parts described and shown here except insofar as such forms are included in the following claims.

What is claimed is:

1. A method for assembling eyeglasses comprising:

selecting a lens from an inventory containing a plurality of circular lenses, each of said circular lenses having the same geometric and optical center, and a range of prescriptive dimensions;

mounting the lens to the annular eyewire of the eyeglasses;

rotating the lens to align a lens axis mark with an eyewire axis mark so that the lens' cylindrical axis is aligned according to a patient's prescription; and

securing the lens in place so the lens cannot rotate.

2. The method of claim **1** wherein the step of securing the lens further comprises selecting a nosepiece with an appropriate width from an inventory having a range of sizes of nosepieces; and securing the lens in place with the nosepiece.

3. The method of claim **2** further comprising the step of selecting the appropriate width by determining if a geometric and an optical center of the lens will be spaced at a pupillary distance required by the patient's prescription.

4. The method of claim **1** wherein the inventor further comprises a plurality of lenses wherein each of said plurality of lenses does not require decentration by grinding.

5. The method of claim **1** wherein the circular shape of the lens allows the lens to be rotated within the annular eyewire prior to being secured.

6. The method of claim **1** wherein decentration of the optical centers of the lenses is accomplished by selection of an interchangeable nosepiece with a width selected in accordance with a patient's prescription.

7. A method for assembling eyeglasses comprising:

using an interchangeable lens eyeglass system having an annular eyewire, a nosepiece, and a clasp pivotally joined to the nosepiece, selecting a lens from an inventory containing a plurality of circular lenses having the same geometric and optical center and a range of prescriptive dimensions;

mounting the lens to the annular eyewire of the eyeglasses;

rotating the lens so that the lens is aligned according to a patient's prescription;

securing the lens in place so that the lens cannot rotate by rotating the clasp from a first position to a second position.

8. The method of claim **7** wherein the step of rotating further comprises aligning a lens axis mark with an eyewire axis mark so that the lens' cylindrical axis is aligned according to the patient's prescription.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,786,592 B2
DATED : September 9, 2004
INVENTOR(S) : Rivera

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1,
Line 60, "lip" should be deleted

Signed and Sealed this

Thirtieth Day of November, 2004

Jon W. Dudas

JON W. DUDAS
Director of the United States Patent and Trademark Office